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10/767,282	01/30/2004	Takefumi Yamada	248308US90	4283

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EXAMINER	
AGHDAM, FRESHTEH N	
ART UNIT	**PAPER NUMBER**
2611	

NOTIFICATION DATE	DELIVERY MODE
12/28/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/767,282	YAMADA ET AL.	
	Examiner	**Art Unit**	
	FRESHTEH N. AGHDAM	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 August 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2,4-9,12-20,23-30 and 33-40* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *5,6,8,9,15,16,18,19,26,27,29,30,35,38 and 39* is/are allowed.

6)☒ Claim(s) *1,2,4,7,12-14,17,20,23-25,28,33,34,37 and 40* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed August 31, 2009 have been fully considered but they are not persuasive.

Applicant's Argument(s):

Regarding claim 1, page 50, the Applicant argues that the newly added limitation "the information of channel state from the channel information accumulation unit corresponds to a channel state estimated at a time when the transmission weights currently being used at the transmitter were calculated."

Additionally, the Applicant requested documentary evidence in a subsequent office action to support the assertion that the limitation of "the information of channel state from the channel information accumulation unit corresponds to a channel state estimated at a time when the transmission weights currently being used at the transmitter were calculated."

Examiner's Response:

Regarding the first argument set forth above, Examiner disagrees with the Applicant because Onggosanusi teaches the channel information corresponds to a channel sate estimated at a time when the transmission weights currently being used at the transmitter were calculated since the channel information is obtained from the received signal that has been weighted in the transmitter prior to being sent to the receiver (fig. 4, means 410).

Regarding the Applicant's request set forth above, the following reference is provided:

Beck et al (US 2002/0101825) see paragraph 33.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-2, 4, 7, 12-14, 17, 20, 23-25, 28, 33-34, 37, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugar et al (US 7,194,237), further in view of Pautler et al (US 2003/0185309) and Onggosanusi et al (US 2004/0076224).

As to claim 1, Sugar teaches a MIMO communication system comprising a transmitter with 1 to N antennas (fig. 1 means 110) and a receiver with 1 to L antennas (means 210), in which said transmitter comprises: a transmission signal generator for generating a transmission signal s (fig. 1, col. 2 lines 35-56, one of ordinary skill in the art would recognize that the transmission signal s is inherently generated by a signal generator); a signal dividing unit for dividing the transmission signal into 1 to K (signal s is divided to signals s1 to sL. One of ordinary skill in the art would recognize that signal s is inherently divided into signals s1 to sL) signal streams according to transmission weights derived from feedback information informed from the receiver through a feedback path (col. 2 lines 57-64); a signal modulator for modulating the generated

transmission signal (col. 3 lines 8-12)); a stream processor for dividing respective 1 to k modulated signal streams into 1 to N substreams (fig. 1 device 100) and multiplying the 1 to N substreams by the 1 to N transmission weights device 100, wT,1 to wT,N); and said receiver comprising: a channel state estimating means for estimating state of each communication channel from received signals received by the 1 to L antennas (col. 6 lines 20-37) to output information of channel state; a feedback signal generating means for generating feedback information according to the information of channel state (col. 2 lines 57-64); a proper reception weight generating means for generating proper reception weights by using the information of channel state (col. 6 lines 20-37); a reception weight multiplier for multiplying the received 1 to L substreams of the respective 1 to K signal streams by the proper 1 to L reception weights (wR, device 200); a demodulator for composing the 1 to L weighted substreams to obtain respective composed 1 to K signal streams respectively (fig. 1 s1 and sL outputted from device 200). One of ordinary skill in the art would recognize that it is well known in the art to accumulate the channel information over a period of time to obtain the average channel information, which is a more reliable channel parameter than the instantaneous channel information to better and more accurately generate the reception weights. Therefore, it would have been obvious to one of ordinary skill in the art to accumulate the channel information for a predetermined interval for the reason stated above. One of ordinary skill in the art would further recognize that it is well known in the art to obtain condition of received power by using information of channel estimation, wherein condition of received power (such as RSSI) would be used in addition to the accumulated channel

information to better and more accurately generate the reception weights since there are variety of channel information parameters/indicators that could be used such as SNR, RSSI, CIR, and so forth. As a result, the more information is gathered about the channel condition the more accurate the reception weights would be. Sugar does not expressly teach a signal dividing unit for dividing the transmission signal into 1 to K signal streams according to transmission weights derived from feedback information informed from the receiver through a feedback path; a signal modulator for modulating the 1 to K signal substreams respectively; a feedback delay compensating means for processing the feedback information in order to compensate feedback delay of the feedback path; a proper reception weight generating means for generating proper reception weights by using the information of the channel state and the processed feedback information from the feedback delay compensating means; and a signal combining unit corresponding to the signal dividing unit of the transmitter for combining the demodulated K signal streams from the demodulator to reproduce the original transmission signal. Pautler teaches a MIMO communication system comprising a transmitter and a receiver (fig. 3 and 5), wherein the transmitter comprises a signal dividing means for dividing the transmission signal into 1 to K (signal X) signal streams according to transmission weights derived from feedback information informed from the receiver through a feedback path (par. 61, 70, 72-73, and 75, means 70, 36, and 34); a signal modulator for modulating the 1 to K signal substreams respectively (fig. 3 modulation means); and the receiver comprises: a signal combining unit corresponding to the signal dividing unit of the transmitter for combining the demodulated K signal

streams from the demodulator to reproduce the original transmission signal. Therefore, it would have been obvious to one of ordinary skill in the art to modify the system of Sugar utilizing the teaching of Pautler by dividing the transmission signal into 1 to K (signal X) signal streams according to transmission weights derived from feedback information informed from the receiver through a feedback path in order to more accurately distributing the transmission signal, also, one of ordinary skill in the art would recognize it is obvious to modify the system of Sugar according to the teaching of Pautler by modulating the transmission signal after being divided into substreams 1 to K instead of prior to being divided into substreams, and at last, it would have been obvious to one of ordinary in the art to combine the recovered substreams 1 to K in order to recover the original transmission signal. Onggosaunusi teaches a MIMO communication system comprising a transmitter and a receiver (fig. 2a and 2b), wherein the receiver comprises a channel estimation means for estimating state of each communication channel from received signals (fig. 4 means 410); a feedback delay compensating means for processing the feedback information in order to compensate feedback delay of the feedback path (means 415); a proper reception weight generating means for generating proper reception weights by using the information of the channel state and the processed feedback information from the feedback delay compensating means (means 425) in order to properly demodulate and recover/ reproduce the original transmitted signal. Onggosanusi further teaches the channel information corresponds to a channel sate estimated at a time when the transmission weights currently being used at the transmitter were calculated since the channel information is obtained from the

received signal that has been weighted in the transmitter prior to being sent to the receiver (fig. 4, means 410).Therefore, it would have been obvious to one of ordinary skill in the art to incorporate the teaching of Onggosanusi into the system of Sugar for the reason stated above.

As to claim 2, Sugar teaches a MIMO communication system comprising a transmitter with 1 to N antennas (fig. 1 means 110) and a receiver with 1 to L antennas (means 210), in which said receiver comprises: a channel state estimating means for estimating state of each communication channel from received signals received by the 1 to L antennas (col. 6 lines 20-37) to output information of channel state; a feedback signal generating means for generating feedback information according to the information of channel state (col. 2 lines 57-64); a proper reception weight generating means for generating proper reception weights by using the information of the channel state (col. 6 lines 20-37); a reception weight multiplier for multiplying the received 1 to L substreams of the respective 1 to K signal streams by the proper 1 to L reception weights (wR, device 200); a demodulator for composing the 1 to L weighted substreams to obtain respective composed 1 to K signal streams respectively (fig. 1 s1 and sL outputted from device 200). One of ordinary skill in the art would recognize that it is well known in the art to accumulate the channel information over a period of time to obtain the average channel information, which is a more reliable channel parameter than the instantaneous channel information to better and more accurately generate the reception weights. Therefore, it would have been obvious to one of ordinary skill in the art to accumulate the channel information for a predetermined interval for the reason stated

above. One of ordinary skill in the art would further recognize that it is well known in the art to obtain condition of received power by using information of channel estimation, wherein condition of received power (such as RSSI) would be used in addition to the accumulated channel information to better and more accurately generate the reception weights since there are variety of channel information parameters/indicators that could be used such as SNR, RSSI, CIR, and so forth. As a result, the more information is gathered about the channel condition the more accurate the reception weights would be. Sugar does not expressly teach a feedback delay compensating means for processing the feedback information in order to compensate feedback delay of the feedback path; a proper reception weight generating means for generating proper reception weights by using the information of the channel state and the processed feedback information from the feedback delay compensating means; and a signal combining unit for combining the demodulated K signal streams from the demodulator to reproduce the original transmission signal. Pautler teaches a MIMO communication system comprising a transmitter and a receiver (fig. 3 and 5), wherein the receiver comprises a signal combining unit corresponding to the signal dividing unit of the transmitter for combining the demodulated K signal streams from the demodulator to reproduce the original transmission signal. Therefore, it would have been obvious to one of ordinary in the art to combine the recovered substreams 1 to K in order to recover the original transmission signal. Onggosaunusi teaches a MIMO communication system comprising a transmitter and a receiver (fig. 2a and 2b), wherein the receiver comprises a channel estimation means for estimating state of each communication

channel from received signals (fig. 4 means 410); a feedback delay compensating means for processing the feedback information in order to compensate feedback delay of the feedback path (means 415); a proper reception weight generating means for generating proper reception weights by using the information of the channel state and the processed feedback information from the feedback delay compensating means (means 425) in order to properly demodulate and recover/ reproduce the original transmitted signal. Onggosanusi further teaches the channel information corresponds to a channel sate estimated at a time when the transmission weights currently being used at the transmitter were calculated since the channel information is obtained from the received signal that has been weighted in the transmitter prior to being sent to the receiver (fig. 4, means 410).Therefore, it would have been obvious to one of ordinary skill in the art to incorporate the teaching of Onggosanusi into the system of Sugar for the reason stated above.

As to claim 4, Sugar teaches a channel state estimating means for estimating state of each communication channel from received signals received by the 1 to L antennas (col. 6 lines 20-37) to output information of channel state; a feedback signal generating means for generating feedback information according to the information of channel state (col. 2 lines 57-64); a transmission weight generator for generating K*N transmission weights based on the information of channel estimation from the channel state information unit and sending the transmission weights as the feedback information to a the transmitter through the feedback path (device 100, col. 2, lines 57-64); a proper reception weight generating means comprises: the receiving weight generating unit for

generating K*L proper reception weights by using the information of channel state. Onggosaunusi teaches a MIMO communication system comprising a transmitter and a receiver (fig. 2a and 2b), wherein the receiver comprises a channel estimation means for estimating state of each communication channel from received signals (fig. 4 means 410); a feedback delay compensating means comprising a transmission weight accumulation unit for accumulating the transmission weights for a predetermined interval and outputting the accumulated transmission weights as the processed feedback information (means 415, 425 and 435).

As to claim 7, Sugar teaches a channel state estimating means for estimating state of each communication channel from received signals received by the 1 to L antennas (col. 6 lines 20-37) to output information of channel state; a feedback signal generating means for generating feedback information according to the information of channel state (col. 2 lines 57-64); a transmission weight generator for generating K*N transmission weights based on the information of channel estimation from the channel state information unit and sending the transmission weights as the feedback information to a the transmitter through the feedback path (device 100, col. 2, lines 57-64); a proper reception weight generating means comprises: the receiving weight generating unit for generating K*L proper reception weights by using the information of channel state. One of ordinary skill in the art would recognize that it is well known in the art to store the past estimated channel information and adjust the channel information according to the stored past channel information and time delay of the communication channel in order to better observe and/or obtain the channel state information. Onggosaunusi teaches a

MIMO communication system comprising a transmitter and a receiver (fig. 2a and 2b), wherein the receiver comprises a channel estimation means for estimating state of each communication channel from received signals (fig. 4 means 410); a feedback delay compensating means comprising a transmission weight accumulation unit for accumulating the transmission weights for a predetermined interval and outputting the accumulated transmission weights as the processed feedback information (means 415, 425 and 435); a proper reception weight generating means for generating proper reception weights by using the information of the channel state and the processed feedback information from the feedback delay compensating means (means 415, 425 and 435) in order to properly demodulate and recover/ reproduce the original transmitted signal.

As to claim 12, see the rejections of claims 1-2 combined. Sugar teaches a channel state estimating means for estimating state of each communication channel from received signals received by the 1 to L antennas (col. 6 lines 20-37) to output information of channel state; a feedback signal generating means for generating feedback information according to the information of channel state (col. 2 lines 57-64); a transmission weight generator for generating K*N transmission weights based on the information of channel estimation from the channel state information unit and sending the transmission weights as the feedback information to a the transmitter through the feedback path (device 100, col. 2, lines 57-64). One of ordinary skill in the art would recognize that it is well known in the art for the transmission weight generator to produce the transmission weights employing different computation techniques (see

Onggosanusi par. 50), wherein one method of computation would be storing the past transmission weights and updating/ adjusting the transmission weights based on the channel information such as time delay information of the communication channel. Therefore, it would have been obvious to one of ordinary skill in the art to obtain the transmission weight employing the above technique. Onggonsanusi further teaches accumulating the computed transmission weights for a predetermined interval as the processed feedback information. Sugar teaches that the transmission weights are generated either in the receiver (e.g. feedback) or the transmission weights are generated in the transmitter. One of ordinary skill in the art would recognize that every time that the new channel information is obtained (if it is different than the previous channel information), the new transmission weight is obtained then the feedback information is updated (adjusted).

As to claims 13 and 33, see the rejection of claim 2. Sugar teaches a channel state estimating means for estimating state of each communication channel from received signals received by the 1 to L antennas (col. 6 lines 20-37) to output information of channel state; a feedback signal generating means for generating feedback information according to the information of channel state (col. 2 lines 57-64); a transmission weight generator for generating K*N transmission weights based on the information of channel estimation from the channel state information unit and sending the transmission weights as the feedback information to a the transmitter through the feedback path (device 100, col. 2, lines 57-64); the proper reception weight generating means comprises: a receiving weight generating unit for generating K*L proper

reception weights by using the information of channel state. Onggosaunusi teaches a MIMO communication system comprising a transmitter and a receiver (fig. 2a and 2b), wherein the receiver comprises a channel estimation means for estimating state of each communication channel from received signals (fig. 4 means 410); a feedback delay compensating means comprising a transmission weight accumulation unit for accumulating the transmission weights for a predetermined interval and outputting the accumulated transmission weights as the processed feedback information (means 415, 425 and 435); a proper reception weight generating means for generating proper reception weights by using the information of the channel state and the processed feedback information from the feedback delay compensating means (means 415, 425 and 435) in order to properly demodulate and recover/ reproduce the original transmitted signal. Sugar teaches that the transmission weights are generated either in the receiver (e.g. feedback) or the transmission weights are generated in the transmitter. One of ordinary skill in the art would recognize that every time that the new channel information (if it is different than the previous channel information), the new transmission weight (if it is different than the previous transmission weight) is obtained the feedback information is updated (adjusted).

As to claim 14, see the rejections of claims 2 and 13. Sugar teaches a channel state estimating means for estimating state of each communication channel from received signals received by the 1 to L antennas (col. 6 lines 20-37) to output information of channel state; a feedback signal generating means for generating feedback information according to the information of channel state (col. 2 lines 57-64); a

transmission weight generator for generating K*N transmission weights based on the information of channel estimation from the channel state information unit and sending the transmission weights as the feedback information to a the transmitter through the feedback path (device 100, col. 2, lines 57-64); the proper reception weight generating means comprises: a receiving weight generating unit for generating K*L proper reception weights by using the information of channel state. Onggosaunusi teaches a MIMO communication system comprising a transmitter and a receiver (fig. 2a and 2b), wherein the receiver comprises a channel estimation means for estimating state of each communication channel from received signals (fig. 4 means 410); a feedback delay compensating means comprising a transmission weight accumulation unit for accumulating the transmission weights for a predetermined interval and outputting the accumulated transmission weights as the processed feedback information (means 415, 425 and 435); a proper reception weight generating means for generating proper reception weights by using the information of the channel state and the processed feedback information from the feedback delay compensating means (means 415, 425 and 435) in order to properly demodulate and recover/ reproduce the original transmitted signal. Furthermore, one of ordinary skill in the art would recognize that transmission weight generator 415 or part of the transmission weight generator 415 (see Onggosanusi, fig. 4) could be part of the channel estimation 410 in order to save space and reduce the size of the receiver. Therefore, it would have been obvious to one of ordinary skill in the art to make the proposed modification for the reason stated above. One of ordinary skill in the art would recognize that every time that the new

channel information (if it is different than the previous channel information), the new transmission weight (if it is different than the previous transmission weight) is obtained the feedback information is updated (adjusted).

As to claim 17, see the rejections of claims 7 and 13 combined.

As to claim 20, see the rejection of claim 13. Sugar teaches a channel state estimating means for estimating state of each communication channel from received signals received by the 1 to L antennas (col. 6 lines 20-37) to output information of channel state; a feedback signal generating means for generating feedback information according to the information of channel state (col. 2 lines 57-64); a transmission weight generator for generating K*N transmission weights based on the information of channel estimation from the channel state information unit and sending the transmission weights as the feedback information to a the transmitter through the feedback path (device 100, col. 2, lines 57-64); a proper reception weight generating means comprises: the receiving weight generating unit for generating K*L proper reception weights by using the information of channel state. Pautler further teaches that the feedback information generating means comprises a transmission weight quantization unit for quantizing the transmission weights and sending the quantized transmission weights as the feedback information to a transmitter through the feedback path (fig. 5 means 130, par. 72) in order to select the desired antenna array weight sets while the amount of feedback data is reduced (par. 72). Therefore, it would have been obvious to one of ordinary skill in the art to modify the system of Sugar utilizing the teaching of Pautler for the reason stated above. Onggosaunusi teaches a MIMO communication

system comprising a transmitter and a receiver (fig. 2a and 2b), wherein the receiver comprises a channel estimation means for estimating state of each communication channel from received signals (fig. 4 means 410); a feedback delay compensating means comprising a transmission weight accumulation unit for accumulating the transmission weights for a predetermined interval and outputting the accumulated transmission weights as the processed feedback information (means 415, 425 and 435); a proper reception weight generating means for generating proper reception weights by using the information of the channel state and the processed feedback information from the feedback delay compensating means (means 415, 425 and 435) in order to properly demodulate and recover/ reproduce the original transmitted signal.

As to claims 23-24, see the rejections of claims 1-2 combined. Sugar teaches a channel state estimating means for estimating state of each communication channel from received signals received by the 1 to L antennas (col. 6 lines 20-37) to output information of channel state; a feedback signal generating means for generating feedback information according to the information of channel state (col. 2 lines 57-64); a transmission weight generator for generating K*N transmission weights based on the information of channel estimation from the channel state information unit and sending the transmission weights as the feedback information to a the transmitter through the feedback path (device 100, col. 2, lines 57-64); a proper reception weight generating means comprises: the receiving weight generating unit for generating K*L proper reception weights by using the information of channel state. Pautler further teaches that

the feedback information generating means comprises a transmission weight quantization unit for quantizing the transmission weights and sending the quantized transmission weights as the feedback information to a transmitter through the feedback path (fig. 5 means 130, par. 72) in order to select the desired antenna array weight sets while the amount of feedback data is reduced (par. 72). Therefore, it would have been obvious to one of ordinary skill in the art to modify the system of Sugar utilizing the teaching of Pautler for the reason stated above. Onggosaunusi teaches a MIMO communication system comprising a transmitter and a receiver (fig. 2a and 2b), wherein the receiver comprises a channel estimation means for estimating state of each communication channel from received signals (fig. 4 means 410); a feedback delay compensating means comprising a transmission weight accumulation unit for accumulating the transmission weights for a predetermined interval and outputting the accumulated transmission weights as the processed feedback information (means 415, 425 and 435); a proper reception weight generating means for generating proper reception weights by using the information of the channel state and the processed feedback information from the feedback delay compensating means (means 415, 425 and 435) in order to properly demodulate and recover/ reproduce the original transmitted signal.

As to claim 25, see the rejections of claims 4 and 23 combined.

As to claim 28, see the rejections of claims 7 and 23 combined.

As to claim 33, see the rejections of claims 1-2 combined. Sugar teaches a channel state estimating means for estimating state of each communication channel

from received signals received by the 1 to L antennas (col. 6 lines 20-37) to output information of channel state; a feedback signal generating means for generating feedback information according to the information of channel state (col. 2 lines 57-64); a transmission weight generator for generating K*N transmission weights based on the information of channel estimation from the channel state information unit and sending the transmission weights as the feedback information to a the transmitter through the feedback path (device 100, col. 2, lines 57-64); a proper reception weight generating means comprises: the receiving weight generating unit for generating K*L proper reception weights by using the information of channel state. Pautler further teaches that the feedback information generating means comprises a transmission weight quantization unit for quantizing the transmission weights and sending the quantized transmission weights as the feedback information to a transmitter through the feedback path (fig. 5 means 130, par. 72) in order to select the desired antenna array weight sets while the amount of feedback data is reduced (par. 72). Therefore, it would have been obvious to one of ordinary skill in the art to modify the system of Sugar utilizing the teaching of Pautler for the reason stated above. Onggosaunusi teaches a MIMO communication system comprising a transmitter and a receiver (fig. 2a and 2b), wherein the receiver comprises a channel estimation means for estimating state of each communication channel from received signals (fig. 4 means 410); a feedback delay compensating means comprising a transmission weight accumulation unit for accumulating the transmission weights for a predetermined interval and outputting the accumulated transmission weights as the processed feedback information (means 415,

425 and 435); a proper reception weight generating means for generating proper reception weights by using the information of the channel state and the processed feedback information from the feedback delay compensating means (means 415, 425 and 435) in order to properly demodulate and recover/ reproduce the original transmitted signal. Furthermore, one of ordinary skill in the art would recognize that every time that the new channel information (if it is different than the previous channel information), the new transmission weight (if it is different than the previous transmission weight) is obtained the feedback information is updated (adjusted).

As to claim 34, see the rejection of claim 13. Sugar teaches that the transmission weights are generated either in the receiver (e.g. feedback) or the transmission weights are generated in the transmitter (e.g. the estimated channel information is sent to the transmitter and the transmitter generates the transmission weights itself). Also, one of ordinary skill in the art would recognize that it is well known in the art to accumulate the estimated channel information for further processing. Sugar teaches a channel state estimating means for estimating state of each communication channel from received signals received by the 1 to L antennas (col. 6 lines 20-37) to output information of channel state; a feedback signal generating means for generating feedback information according to the information of channel state (col. 2 lines 57-64); a transmission weight generator for generating K*N transmission weights based on the information of channel estimation from the channel state information unit and sending the transmission weights as the feedback information to a the transmitter through the feedback path (device 100, col. 2, lines 57-64); the proper reception weight generating means

comprises: a receiving weight generating unit for generating K*L proper reception weights by using the information of channel state. Onggosaunusi teaches a MIMO communication system comprising a transmitter and a receiver (fig. 2a and 2b), wherein the receiver comprises a channel estimation means for estimating state of each communication channel from received signals (fig. 4 means 410); a feedback delay compensating means comprising a transmission weight accumulation unit for accumulating the transmission weights for a predetermined interval and outputting the accumulated transmission weights as the processed feedback information (means 415, 425 and 435); a proper reception weight generating means for generating proper reception weights by using the information of the channel state and the processed feedback information from the feedback delay compensating means (means 415, 425 and 435) in order to properly demodulate and recover/ reproduce the original transmitted signal.

As to claim 37, see the rejections of claims 7 and 33 combined.

As to claim 40, see the rejections of claims 4 and 33 combined.

Allowable Subject Matter

Claims 5-6, 8-9, 15-16, 18-19, 26-27, 29-30, 35, and 38-39 are allowed.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to FRESHTEH N. AGHDAM whose telephone number is (571)272-6037. The examiner can normally be reached on 9:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on 571-272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/F. N. A./

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